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# NOTES ON AN OCCURRENCE OF MANGANESE AND ZINC ORE IN NOVA SCOTIA.

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*Read before the Nova Scotia Mining Society, June meeting, 1893.*

These brief notes are intended only to bring to the notice of the members of the Society an occurrence of manganese in a form which is, I think, new in this Province, and of an interesting specimen of zinc ore.

In the case of the former, samples of rock were brought to me from Whitehead, in Guysboro' County, which had excited the curiosity of the discoverer by the readiness with which pieces of it fused in an ordinary fire. This ready fusibility of certain rocks is not generally known, and is usually considered a mark of the presence of some valuable metal. In this case the metal was, for some reason unknown to me, considered to be zinc. The rock, a sample of which is submitted, is light brown and grey in color, weathering to a light drab. It is hard, brittle and subgranular in texture. The sample shows a folding in the shape of the letter S, and has crevices, apparently due to the folding, filled with crystalline matter slightly darker than the surrounding rock.

The samples, although resembling in a general way the rocks called felsites, had features of novelty about them, and I sent some to Mr. Leckie, manager of the Londonderry Iron Works, and the analyst of the company, Mr. Smaill, was kind enough to make a partial analysis of it. He reports that it contained :—

| | |
|---|---|
| Silica | 70·25 |
| Alumina | 15·25 |
| Manganese oxide | 9·25 |
| Iron oxide | Small quantity. |
| Lime | " |
| Magnesia | " |
| Zinc | none. |

The remainder being probably moisture, with some potash, soda, carbonic acid, etc.

Having disposed of the zinc theory, the presence of manganese became interesting. Presumably the manganese present is in the form of a bi-silicate of manganese, such as rhodonite, and that the greyish red or brown color of part of the sample may be due to the partial penetration of the rock by some carbonate of lime, manganese, etc. Dana, in his Mineralogy, does not give any analyses of the varieties of the silicates in any way resembling that under consideration. Allowing for the presence of a certain amount of free silica, as is usually the case in rocks of the class under considera

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tion, the analyses given by him of orthoclase, present a parallelism with the exception of the absence of potash and the presence of manganese, the typical composition of this mineral being:—

| | |
|---|---|
| Silica | 64·60 |
| Alumina | 18·50 |
| Potash | 16·90 |

It would appear probable that the manganese has replaced nearly all the potash. The addition of moisture and free silica, and the replacement of part of the alumina and potash by the small quantities of iron, lime and magnesia would give a compound almost identical with that before you. All the analyses of orthoclase given on pages 356 to 361, of Dana's Mineralogy, have silica contents of from 64 to 75 percentum, and contain iron, magnesia, lime, soda, etc., in varying amounts up to about four per cent.

The same may be said of the possibility of the manganese having replaced the soda in an albite, the typical composition of which is:—

| | |
|---|---|
| Silica | 68·6 |
| Alumina | 19·6 |
| Soda | 11·8 |

In this case also the other foreign oxides would have replaced part of the soda and alumina.

It appears that feldspars are altered by the action of waters containing carbonic acid, or alkalies, or rendered acid by the decomposition of sulphurets. The completion of a course of decomposition of feldspar by the agency of water containing carbonic acid is the formation of a kaolin, or hydrous silicate of alumina; but there are many intervening steps modified by circumstances. Thus the presence of lime, iron, etc., leads to changes in composition, forming one or more links in the process. In the case before us it would appear that the mineral most convenient or most applicable has replaced the potash or soda, and marks an important change in the ultimate decomposition of the rock.

The following analyses given by Dana, of minerals resembling most closely in their silica and alumina contents the sample from Whitehead, may be of interest:—

| | Silica. | Alumina. | Iron Ses. Oxide. | Magnesia. | Lime. | Soda. | Potash. | Water. |
|---|---|---|---|---|---|---|---|---|
| 1. Albite | 71·60 | 14·75 | 1·41 | trace | 1·06 | 10·06 | ·32 | ..... |
| 2. do | 70·68 | 19·89 | ·11 | ..... | ·23 | 9·06 | .. | ..... |
| 3. Sanadin | 67.42 | 15·88 | 2·83 | ·15 | 2·77 | ·43 | 10·55 | ..... |
| 4. Microlin | 66·9 | 17·8 | ·5 | ..... | ·6 | 0·5 | 8·3 | ..... |
| 5. Felsite | 71·17 | 13·6 | 1·40 | ·1 | ·4 | ..... | 3·19 | 3·5 |
| 6. Pumice | 70·00 | 16·00 | ·50 | ..... | 2·50 | ..... | 6·50 | 3·0 |

Professor Lawson has kindly handed me an analysis of "Rhombohedral Feldspar" occurring near Rome, by Jameson. This is apparently a Lepidomelane with most of the iron replaced by manganese and lime.

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The following is a comparison of the two minerals :—

| | Lepidomelane. | Rhombohedral Spar. |
|---|---|---|
| Silica | 39·45 | 40·20 |
| Alumina | 9·27 | 9·00 |
| Iron oxide | 37·23 | 1·10 |
| Manganese oxide | 2·54 | 12·60 |
| Lime | ·31 | 20·80 |
| Magnesia | 3·29 | .... |
| Potash | 5·06 | 12·00 |
| Water | 1·83 | .... |

The analysis given by Dana, p. 238, of Gamsigradite, so named from the locality in Servia where it forms with white feldspar a rock termed timazite, may be given in this connection. It is an aluminous iron manganese amphibole, and contains :—

| | |
|---|---|
| Silica | 46·58 |
| Alumina | 13·63 |
| Iron | 12·29 |
| Manganese oxide | 6·00 |
| Magnesia | 8·84 |
| Lime | 8·83 |
| Soda | 3·17 |
| Potash | 1·00 |

I do not know that manganese presented in the form of these samples is of commercial value, but its occurrence in connection with the gold-bearing strata is interesting. If the rock under consideration is to be viewed as a volcanic slag, and as having carried up its manganese contents from some unknown sources, there must be large amounts of this element contained in some silicates, and their decomposition may often prove to be the source of the deposits of manganese ores found in later rocks.

Since writing the above, I have noticed a reference showing the practical relationship of rocks containing manganese to deposits of the ores of that metal of economic value. Mr. Halse, in a paper read recently before the North of England Institute, describes some manganese deposits in one of the hills north-east of Arenig, consisting mainly of Upper Trappean rock, with a mass of feldspathic porphyry. He states, from a careful examination of the veins, that there is no evidence of their being fissure veins, the manganese merely locally filling the joints and certain superficial fissures in the country rock. It appears that the manganese has come from the feldspathic ash itself, and as a result of surface decomposition and erosion has been leached out from it and deposited in the joints and fissures.

It is to be regretted that analyses of the country rock were not given The mode of occurrence of the ore described by Mr. Halse is that usually affected by manganese, and a good example may be seen near the Salmon River of Truro.

The other sample is a compound containing zincite, red oxide of zinc ; Franklinite, an iron black compound of iron, manganese and zinc ; and Willemite, a whitish silicious oxide of zinc.

This was found at Forrest Glen, on the line of the survey of the Stewiacke and Lansdowne railway, by Mr. T. Ritchie, civil engineer. The samples were submitted to Mr. Fletcher of the Geological Survey. He expressed a doubt as to the specimen being from any local deposit on account of its strong resemblance to the New Jersey ore. Mr. Ritchie, however, assured me that he had made full enquiry, and was satisfied that the sample had not been introduced, but was actually discovered. I give the occurrence as of interest on account of the rarity of zinc ore in the Province of Nova Scotia. It is found in small quantities in the gold bearing quartz veins, as traces in manganiferous ores, and occasionally in the carbonate ores of the coal measures.

In New Jersey, at both Franklin and Sterling, these three ores occur together, and in such quantity as to furnish an important ore of zinc. If, on further examination, the authenticity of the occurrence at Forrest Glen is confirmed, and the float traced to its source, an important addition may be made to the list of our mineral resources.